Curiosity Guide #702
Sound Frequency
Accompanies Curious Crew, Season 7, Episode 2 (#702)

Nutty Balloon
Investigation #4

Description
Don’t get too nutty with this fun investigation!

Materials
• Hex nut
• 2 balloons
• 1 penny

Procedure
1) Insert the hex nut into one deflated balloon and the penny inside the second balloon.
2) Blow up each balloon and tie closed.
3) Hold the top of the penny balloon and begin to quickly rotate your wrist to get the penny spinning inside the balloon.
4) What do you notice?
5) Try the experiment again with the hex nut balloon. What do you notice?
6) What happens if you speed up the rotation of the nut? What do you notice?

Results
Explanation
Not only can you hear the difference between the penny balloon and the hex nut balloon, but you can also feel a difference as well. As the object slides around the inside of the balloon, the friction produces a vibration through the latex that can be heard and felt. The edges of the hex nut have greater resistance than the small edge of the penny, so the hex nut produces more sound. Speeding up the movement of the hex nut increases the frequency of the vibrations, which raises the pitch that the hex nut produces. Spinning the hex nut balloon faster makes a higher sound, while spinning this balloon slower produces a lower sound.

Imagine a tuning fork that gets bumped. The tines wiggle back and forth at a certain speed and hit particles in the air that we hear as sound. A short tuning fork vibrates quickly, so it hits air particles more quickly, and we hear the sound as higher. A longer tuning fork vibrates more slowly, making a lower sound. If you look closely at the base of the tuning fork, there is often a letter that shows the note the particular fork produces, and a number that tells us how many times it vibrates each second. Wow, 659 times a second? That is some quick wiggling!

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